Valuing Oil and Gas Assets

Methodologies, Applications, and Common Sources of Disagreement



White Paper

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Executive Summary

The valuation of oil and gas assets presents challenges that distinguish the exploration and production industry from most other sectors of the economy. Unlike conventional industrial businesses, upstream oil and gas companies derive much of their economic value from finite, depleting natural resources. The value of these resources depends not only on the quantities of recoverable hydrocarbons but also on the timing of production, future commodity prices, operating costs, development expenditures, and the risks associated with converting resources into commercial production.

Several methodologies are commonly employed to estimate the value of upstream oil and gas assets. These include discounted cash flow analysis of proved reserves, stock market-based comparisons, and M&A based approaches. Each methodology provides a different perspective on value, and each carries assumptions and limitations that must be understood before its conclusions can be relied upon.

Differences between valuation methodologies become particularly important in acquisitions and divestitures, shareholder disputes, financial reporting, bankruptcy proceedings, contractual disagreements, and litigation involving the determination of economic damages.

A valuation conclusion that is reasonable for one purpose may not be appropriate for another. For example, the Securities and Exchange Commission's standardized measure of discounted future net cash flows is governed by prescribed assumptions and should not automatically be interpreted as the fair market value of an oil and gas company's reserves.

Similarly, valuation multiples derived from publicly traded companies may be informative but require careful consideration of differences in asset quality, reserves, development inventories, operating costs, geographic location, and financial structure.

The central principle of sound oil and gas valuation is that a methodology must be appropriate for the asset being valued, the purpose of the analysis, the applicable standard of value, and the information reasonably available as of the valuation date.

1. The Economic Characteristics of Upstream Oil and Gas Assets

Several fundamental characteristics influence the valuation of upstream petroleum assets.

Resource depletion. Oil and gas production generally declines over time as hydrocarbons are extracted from underground reservoirs. Consequently, companies must continually invest in drilling, development, acquisitions, or enhanced recovery operations to replace declining production and sustain their economic value.

Commodity price exposure. Oil and natural gas prices can materially influence profitability, future capital expenditures, reserve economics, and asset values. A relatively modest change in price assumptions may produce a disproportionately large change in estimated value, particularly for higher-cost properties.

Reserve uncertainty. Proved reserves represent estimates of commercially recoverable quantities under specified technical and economic conditions. Additional potential value may exist in probable reserves, possible reserves, contingent resources, and undeveloped acreage, but the economic risks and probabilities associated with these categories differ.

Capital intensity. Recovering oil and gas frequently requires significant investment in drilling, completions, production facilities, and infrastructure. The timing and magnitude of these expenditures can substantially affect discounted cash flow estimates.

Asset heterogeneity. Two properties with similar production rates or reserve volumes may have materially different values because of variations in commodity mix, reservoir quality, production decline, operating costs, transportation access, fiscal terms, and development opportunities.

These characteristics explain why conventional financial valuation metrics, while useful, frequently require industry-specific adjustments when applied to oil and gas companies.

2. Discounted Cash Flow and Net Asset Value

The discounted cash flow (DCF) methodology estimates value by projecting future net cash flows attributable to an asset and discounting those cash flows to their present value. For an oil and gas property, projected cash flows generally incorporate anticipated production volumes, realized commodity prices, royalties and production taxes, operating expenses, development expenditures, and other relevant cash obligations.

The basic discounted cash flow equation is:

$$\boldsymbol{PV} = \frac{\textbf{Year 1 Cash Flow}}{(\boldsymbol{1}+\boldsymbol{r})^{\boldsymbol{1}}} + \frac{\textbf{Year 2 Cash Flow}}{(\boldsymbol{1}+\boldsymbol{r})^{\boldsymbol{2}}} + \frac{\textbf{Year 3 Cash Flow}}{(\boldsymbol{1}+\boldsymbol{r})^{\boldsymbol{3}}} + \cdots \frac{\textbf{Year } \boldsymbol{n} \textbf{ Cash Flow}}{(\boldsymbol{1}+\boldsymbol{r})^{\boldsymbol{n}}}$$

where:

- PV represents present value.
- r represents the applicable discount rate.
- n represents the applicable number of years.

The discount rate should reflect the time value of money and the risks associated with the projected cash flows. A company-level DCF analysis commonly uses the weighted average cost of capital, while an individual oil and gas property may require a rate reflecting its production, development, and operating risks. The rate must be consistent with the cash flows' tax and inflation assumptions, and analysts should avoid counting the same risk in both the forecasts and the discount rate. Testing a range of rates helps demonstrate how sensitive the valuation is to changing discount rates.

In upstream valuation, a property-level DCF is commonly referred to as a reserve-based valuation. A broader net asset value (NAV) analysis may incorporate developed reserves, undeveloped drilling opportunities, other assets and liabilities, and appropriate corporate-level adjustments. The reliability of a DCF analysis depends heavily on the quality and consistency of its underlying assumptions. Production forecasts must be supported by engineering analyses and reflect realistic decline characteristics. Commodity pricing assumptions should be consistent with the valuation purpose and the information available on the valuation date. Development schedules and capital requirements must be commercially feasible. The discount rate must also be appropriate for the specific cash flow assumptions and risks being evaluated. Although DCF analysis is a fundamental tool in upstream valuation, its apparent mathematical precision should not obscure the uncertainty inherent in forecasting future economic performance. Figure 1 illustrates how identical production can support substantially different values once commodity mix, operating margins, and capital requirements are considered. Both hypothetical assets maintain production of 10,000 boe/d. Asset A has an assumed cash operating margin of $35/boe and requires $36.5 million of annual maintenance capital, compared with $20/boe and $54.75 million for Asset B. These assumptions produce illustrative 10-year present values of $561 million and $112 million, respectively, using a 10% discount rate.

Identical Production Can Support Very Different Values

Hypothetical assets | Same maintained output: 10,000 boe/d each

Valuation driver	Asset A	Asset B
Commodity mix	80% oil / 20% gas	20% oil / 80% gas
Annual base decline before new investment	10%	30%
Cash operating margin before capital spending	$35/boe	$20/boe
Annual maintenance capital to offset decline	$36.5 million ($10/boe produced)	$54.75 million ($15/boe produced)
Annual cash flow after maintenance capital	$91.25 million	$18.25 million
10-year present value at a 10% discount rate	**$561 million**	**$112 million**

Same output. Five times the annual cash flow and present value.

Annual cash flow = 10,000 boe/d × 365 × cash operating margin − maintenance capital.

Illustrative assumptions: Constant production, prices, unit margins and annual maintenance capital for 10 years; year-end cash flows; no terminal value. Maintenance capital is assumed sufficient to offset base decline, so production decline is not deducted again. Commodity mix informs the assumed margins; mix alone does not determine them.

Simplified, pre-income-tax asset cash flows exclude corporate overhead, financing, working capital, abandonment costs and growth projects. These are illustrative 10-year present values, not full fair market valuations or estimates for actual companies. All inputs are hypothetical.

Figure 1 — Identical Production, Different Cash Flows and Values.
Source: Oil & Gas Financial Analytics, LLC

3. SEC Standardized Measure, PV-10, and Fair Market Value

Oil and gas financial reporting incorporates reserve-based measures that are sometimes mistakenly treated as interchangeable with fair market value. The standardized measure of discounted future net cash flows associated with proved reserves incorporates prescribed pricing and cost assumptions, deducts estimated future income taxes, and applies a 10% annual discount rate. PV-10 generally presents the discounted value of proved-reserve future net revenues before income taxes, using the same 10% annual discount rate. Both measures provide useful analytical information, but neither necessarily represents the amount a willing buyer would pay for the underlying assets in an arm's-length transaction. Neither measure necessarily represents fair market value for several reasons:

1. Prescribed reporting prices may differ from market participants expected future commodity prices.
2. A fixed 10% discount rate may not reflect the risks or required return associated with a particular asset.
3. Proved-reserve measures generally exclude potential value from resources and development opportunities outside the proved-reserve classification.
4. A market transaction may reflect operational synergies, existing infrastructure, strategic considerations, or other factors not fully captured by standardized reserve measures.

Consequently, an analyst should distinguish among SEC reserve disclosure measures, engineering-based property valuations, and market-based estimates of economic value.

4. Market-Based Valuation Methods

The market approach estimates value using observed prices for publicly traded companies and completed acquisitions. These sources provide different perspectives on value and require separate consideration.

4.1 Stock Market Based Valuations

Stock market-based valuations use the trading values of publicly listed oil and gas companies to derive valuation multiples. Common measures in the upstream oil and gas space include enterprise value divided by EBITDAX (Earnings Before Interest, Taxes, Depreciation, Depletion, Amortization and Exploration), current production, or proved reserves. The add back of exploration charges is due to the differing accounting treatment in Successful Efforts and Full Cost accounting methodologies. For a lengthier discussion of Full Cost and Successful Efforts accounting methodologies, see our white paper titled: Full Cost vs. Successful Efforts Accounting-Why Accounting Method Still Matters in Upstream Oil & Gas Analysis. Enterprise value generally represents the market value of equity plus debt, less cash. It allows analysts to compare companies with different capital structures, provided the numerator and denominator are defined consistently. The basic Enterprise Value equation for evaluating upstream oil and gas companies is below:

Upstream Enterprise Value= Market Value of Common Stock + Market Value of Debt

-Cash on Balance Sheet - Value of Non-Upstream Assets

Trading multiples reflect investors' expectations for commodity prices, operating performance, development opportunities, and risk. They also incorporate assessments of management, financial leverage, and capital allocation. Table 1 shows the most common Enterprise Value multiples in the upstream oil and gas industry:

Table 1. Stock Market Valuation Metrics

Metric	Typical Application
Enterprise Value / EBITDAX	Comparison of corporate operating earnings and valuation
Enterprise Value / Daily Boe of Production	Comparison of corporate value relative to current production
Enterprise Value / Boe of Proved Reserves	Comparing public-company valuation relative to reserve quantities

Public-company multiples provide market-based indications of corporate value and useful cross-checks against discounted cash flow estimates. Their application requires the comparability analysis discussed in Section 5.

4.2 M&A Based Valuations

M&A based valuations use prices paid in acquisitions of oil and gas properties or companies. Common measures include transaction value divided by daily production, proved reserves, or EBITDAX. Transaction value is the total economic consideration paid or assumed by a buyer to acquire a company or a specified group of assets. This includes cash or equity paid, debt assumed, less any cash acquired in the deal.

These transactions provide evidence of what buyers have agreed to pay for specific assets or businesses. Table 2 presents commonly used M&A valuation metrics.

Table 2. M&A Valuation Metrics

Metric	Typical Application
Transaction Value / Daily Boe of Production	Valuing oil and gas producing assets
Transaction Value / Boe of Proved Reserves	Valuing assets based on reserve quantities (boe)

Transaction multiples provide independent indications of value and useful cross-checks against discounted cash flow estimates. Their application requires an assessment of the assets acquired, transaction terms, and market conditions, as discussed in Section 5.

5. Comparability in Oil and Gas Valuation

Comparability is the most important consideration in applying valuation benchmarks. Calculating a multiple is straightforward. Determining whether that multiple provides meaningful evidence of value requires a detailed understanding of the assets, companies, and transactions being compared. Similar production volumes do not necessarily mean similar economic value. Two producers reporting identical daily production may have substantially different cash flow profiles, capital requirements, and development opportunities. Applying the same valuation multiple to both can obscure the economic differences that ultimately determine value.

KEY BENCHMARKING PRINCIPLE: COMPARABILITY

Similar production volumes do not necessarily mean similar economic value.

Two producers with identical daily production may have substantially different values because of differences in commodity mix, decline rates, operating costs, reserve lives, and undeveloped drilling inventories. A valuation multiple is meaningful only when these differences are understood and accounted for.

Figure 2-Key Benchmarking Principle: Comparability
Source: Oil & Gas Financial Analytics, LLC

5.1 Commodity Mix and Geographic Location

Oil, natural gas, and natural gas liquids have different prices and margins. Expressing production and reserves in barrels of oil equivalent provides a common volume measure, but does not establish economic equivalence. A production or reserve multiple must therefore be interpreted in the context of the underlying commodity mix. Figure 3 illustrates this issue through the enterprise values per daily boe of production and per boe of proved reserves for the 35 publicly traded E&Ps we follow (see Table 3 below) separated into three distinct peer groups. Differences among these groups demonstrate why a single industry-wide multiple can be misleading. Commodity mix provides a starting point for selecting peers, but does not by itself explain every valuation difference. Figure 3 indicates that the oil-weighted peer group traded at higher enterprise values per unit of production and proved reserves on October 14, 2026. These differences are consistent with differing commodity economics, but also reflect operating costs, decline rates, development inventories, and other portfolio characteristics. The relative valuations can change as commodity prices and market expectations evolve.

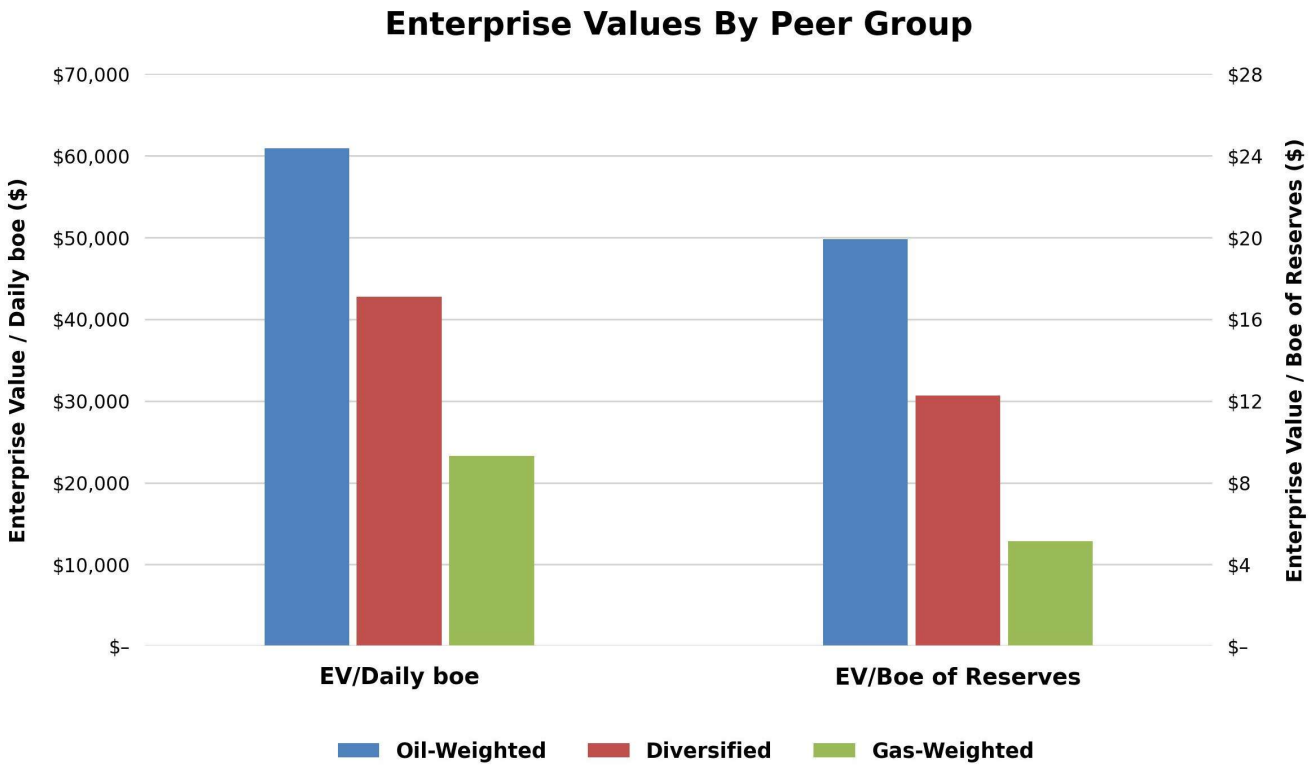


Figure 3-Weighted Average Enterprise Values By Peer Group-October 14, 2026
Source: Oil & Gas Financial Analytics, LLC

Geographic differences remain important even within a peer group. A Permian Basin producer and a California producer may face different realized prices, operating costs, regulatory requirements, and development constraints. Similarly, Appalachian and Gulf Coast natural gas producers may have different transportation arrangements and access to markets. Membership in the same broad peer group does not automatically establish comparability.

Table 3 — Publicly Traded E&P Peer Groups by Commodity Orientation

Oil-Weighted E&Ps — 11 Companies	
Ticker	Company Name
CRC	California Resources Corporation
PR	Permian Resources Corporation
CHRD	Chord Energy Corporation
COP	ConocoPhillips
FANG	Diamondback Energy, Inc.
DVN	Devon Energy Corporation
HPK	HighPeak Energy, Inc.
OXY	Occidental Petroleum Corporation
REPX	Riley Exploration Permian, Inc.
REI	Ring Energy, Inc.
TALO	Talos Energy Inc.

Diversified E&Ps — 15 Companies	
Ticker	Company Name
APA	APA Corporation
CRGY	Crescent Energy Company
OVV	Ovintiv Inc.
EOG	EOG Resources, Inc.
GRNT	Granite Ridge Resources, Inc.
INR	Infinity Natural Resources, Inc.
MNR	Mach Natural Resources LP
MGY	Magnolia Oil & Gas Corporation
MTDR	Matador Resources Company
MUR	Murphy Oil Corporation
NOG	Northern Oil and Gas, Inc.
SM	SM Energy Company
SD	SandRidge Energy, Inc.
VTS	Vitesse Energy, Inc.
WTI	W&T Offshore, Inc.

Gas-Weighted E&Ps — 9 Companies	
Ticker	Company Name
AR	Antero Resources Corporation
DEC	Diversified Energy Company PLC
EXE	Expand Energy Corporation
CRK	Comstock Resources, Inc.
CNX	CNX Resources Corporation
EQT	EQT Corporation
GPOR	Gulfport Energy Corporation
NFG	National Fuel Gas Company
RRC	Range Resources Corporation

Note: Commodity mix is measured as liquids (oil + natural gas liquids) as a percentage of production. Oil-Weighted E&Ps have 70% or more liquids content; Diversified E&Ps have more than 40% but less than 70%; and Gas-Weighted E&Ps have 40% or less. Classifications are intended for comparative valuation and should be assessed using a consistent measurement period.

View the companies and commodity-mix classifications included in this analysis (PDF).

5.2 Production Decline and Capital Requirements

Current production is a snapshot rather than a complete measure of future earning capacity. A mature property with a low production decline rate may sustain production with relatively modest investment, while a rapidly declining shale portfolio may require substantial drilling expenditures to maintain the same output. Identical daily production can therefore support different free cash flow profiles and economic values.

5.3 Reserve Quality and Development Inventory

Reserve comparisons should distinguish proved developed reserves from proved undeveloped reserves. Developed reserves generally require less additional capital to generate production, while undeveloped reserves depend on future spending and execution. Reserve life also matters, although it does not independently establish the timing or profitability of future production. Undeveloped drilling inventories can contribute substantial value, but location counts require scrutiny. Well productivity, development costs, spacing, infrastructure, lease obligations, and drilling schedules influence whether those locations can generate economic returns. Reserve estimates should also be evaluated for differences in classification, measurement dates, and underlying commodity-price assumptions.

5.4 Operating Costs and Financial Measures

Similar production and reserve volumes can support different values when operating costs, royalties, production taxes, transportation commitments, or abandonment obligations differ. These factors influence the cash ultimately available to the owner. EBITDAX comparisons require consistent definitions and reporting periods, including consistent treatment of hedging and other adjustments. Adding back exploration expense helps address an accounting difference between Successful Efforts and Full Cost companies, but does not eliminate differences in asset quality or underlying economics.

5.5 Transaction Scope and Market Conditions

Acquisition prices must be evaluated alongside the assets acquired and liabilities assumed. A purchase price may include producing properties, undeveloped acreage, infrastructure, and other interests. Dividing the entire price by current production or proved reserves can attribute value to those measures that actually relates to other components of the acquisition. Corporate acquisitions may also reflect control of the business, operational synergies, and buyer-specific strategic benefits. These elements may not apply to another buyer or property. Public-company multiples likewise reflect a broader corporate portfolio and should not be applied mechanically to an individual asset. Transaction timing matters because commodity prices, financing conditions, and industry expectations influence acquisition pricing. Enterprise value and transaction value must also be defined consistently and matched to production, reserves, or earnings covering the same assets and ownership interests.

5.6 Selecting and Weighting Benchmarks

The objective is not to find companies or transactions that are identical in every respect. It is to identify material economic differences, assess whether they can be reasonably addressed, and explain their effect on the valuation conclusion. A defensible analysis requires more than calculating an industry-average multiple. When material differences cannot be reliably evaluated, the benchmark should receive less weight or be excluded.

6. Asset-Based Valuation

Asset-based approaches examine the value of a company's underlying assets and liabilities. Historical book values are generally less useful as direct indicators of upstream economic value because the accounting treatment of exploration, development, depletion, depreciation, and impairments may differ substantially from market values. For example, the successful efforts and full cost methods of accounting can generate different carrying amounts for similar exploration and development activities. As a result, two companies with similar underlying properties may report materially different net book values.

An adjusted net asset approach may be appropriate in certain situations, particularly when individual asset values can be established and the related liabilities can be reliably measured. For producing oil and gas properties,

however, reserve-based cash flow methods are ordinarily more informative than historical acquisition and development costs alone.

7. Reconciling Different Valuation Conclusions

It is not unusual for discounted cash flow, market-based, and adjusted asset-based valuations to yield substantially different values for the same oil and gas property or company. These differences do not necessarily indicate that one methodology has been incorrectly applied. Instead, the methods may capture different economic attributes, incorporate different risk assumptions, or address different standards of value. A rigorous valuation analysis should identify the reasons for the differences rather than simply averaging the results. Reconciliation should consider the quality of the available data, the comparability of observed transactions, commodity-price expectations, development opportunities, and the risks embedded in each valuation method.

8. Implications for Litigation and Expert Testimony

Oil and gas valuation disputes frequently involve disagreement over assumptions rather than mathematical calculations. Contested issues may include the appropriate valuation date, projected commodity prices, anticipated drilling activity, reserve classifications, discount rates, selection of comparable transactions, and whether particular development opportunities were reasonably foreseeable at the relevant date. An important responsibility of the valuation expert is to distinguish between information reasonably available at the valuation date and subsequent developments that may improperly introduce hindsight into an analysis. The expert should also evaluate whether the selected methodology is appropriate for the legal and economic question being addressed. In litigation, a defensible valuation opinion requires a transparent methodology, supportable assumptions, reliable underlying information, and a clear explanation of how the evidence supports the valuation conclusion.

Conclusion

No single valuation methodology is universally appropriate for every oil and gas asset or valuation assignment. Discounted cash flow analysis provides a framework for estimating future economic benefits. Market-based methods offer evidence of how investors and buyers price comparable assets. Asset-based approaches help establish the value of underlying resources and other property interests. Each method has strengths and limitations, and those distinctions become especially important when a valuation is challenged. Ultimately, sound upstream valuation depends not simply on selecting an accepted methodology, but on understanding the economics of the particular assets, applying assumptions consistent with the valuation purpose, and reconciling the available evidence into a supportable conclusion.